

Hangzhou Miotlink Technology Co.,Ltd	<b>number:20210524-001</b>	<b>version:V1.0</b>	<b>middle</b>
	<b>name: M35T Series Module Hardware Specification</b>	<b>notes: no</b>	

# **M35T Series Module Hardware Specification V1.0**

## **release note**

date	version	describe	implementer	Approver
December 25, 2024	V1.0	All information	Ping Chen	

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# 1. Product overview

M35T series customized module is a WiFi + BLE module of dedicated smart home Internet of Things with complete functions, highly integrated modules and ultra-low power consumption. The core chip adopts the dedicated Internet of Things (IOT) chip, which has rich peripheral general interfaces. The module has integrated the andlink protocol, flash link and other basic protocol capabilities of China Mobile (Hangzhou) Information Technology Co., Ltd., LTD. The module consists of M35T standard version and M35T (high configuration). The large numbers are M35T, and the small number is M35T-XXXX-xxxx. XXXX represents the difference between different SOC processing capacity and the difference between customer customized programs.

The chip is a new generation of intelligent highly integrated Wi-Fi and BLE combination chip. The wireless subsystem contained a 2.4G RF, Wi-Fi 802.11b/g/n, and BLE baseband / MAC design. The microcontroller subsystem contains a low-power 32-bit RISC CPU, cache, and memory. The power management unit provides flexible settings for low power mode and supports multiple security functions. The common function of this module is serial communication through serial port. The quality and transmission stability of WiFi have been verified by the home appliance industry, and there are very extensive use cases.

## 1. 1 characteristic

- The 32-bit RISC CPU with FPU (floating point unit) can serve as an application processor with a main frequency of 160 MHz
- Frequency range: 2.4~2.4835GHz ISM Band
- Working voltage: 3V-3.6V and working current: 45 mA
- Peripherals: 12 GPIOs, 2 UART
- Package size:  $24\pm0.2\text{mm} \times 16\pm0.2\text{mm} \times 2.6\pm0.2\text{mm}$
- Storage temperature:  $-55^{\circ}\text{C} \sim 85^{\circ}\text{C}$
- Operating temperature:  $-40^{\circ}\text{C} \sim 85^{\circ}\text{C}$
- Safety mechanism: support safe start and safe debugging
- Wi-Fi and Bluetooth connectivity
  - (Channel 1-14@2.4GHz (CH 1-11 for US / CA, CH 1-13 for EU / CN))
  - Support for Bluetooth 5.0 (Low Energy)
  - Support for AES 128 / 192 / 256 encryption engine, WPA 3, MD5, SHA-1 / 224 / 256, PKA (RSA / ECC) encryption engine
  - The STA, Soft AP, and Sniffer modes are supported
  - On-board PCB Onboard antenna
  - Hardware interface: UART, PWM, ADC, DAC, I2C, SPI, GPIO, SDIO

## 1. 2 application area

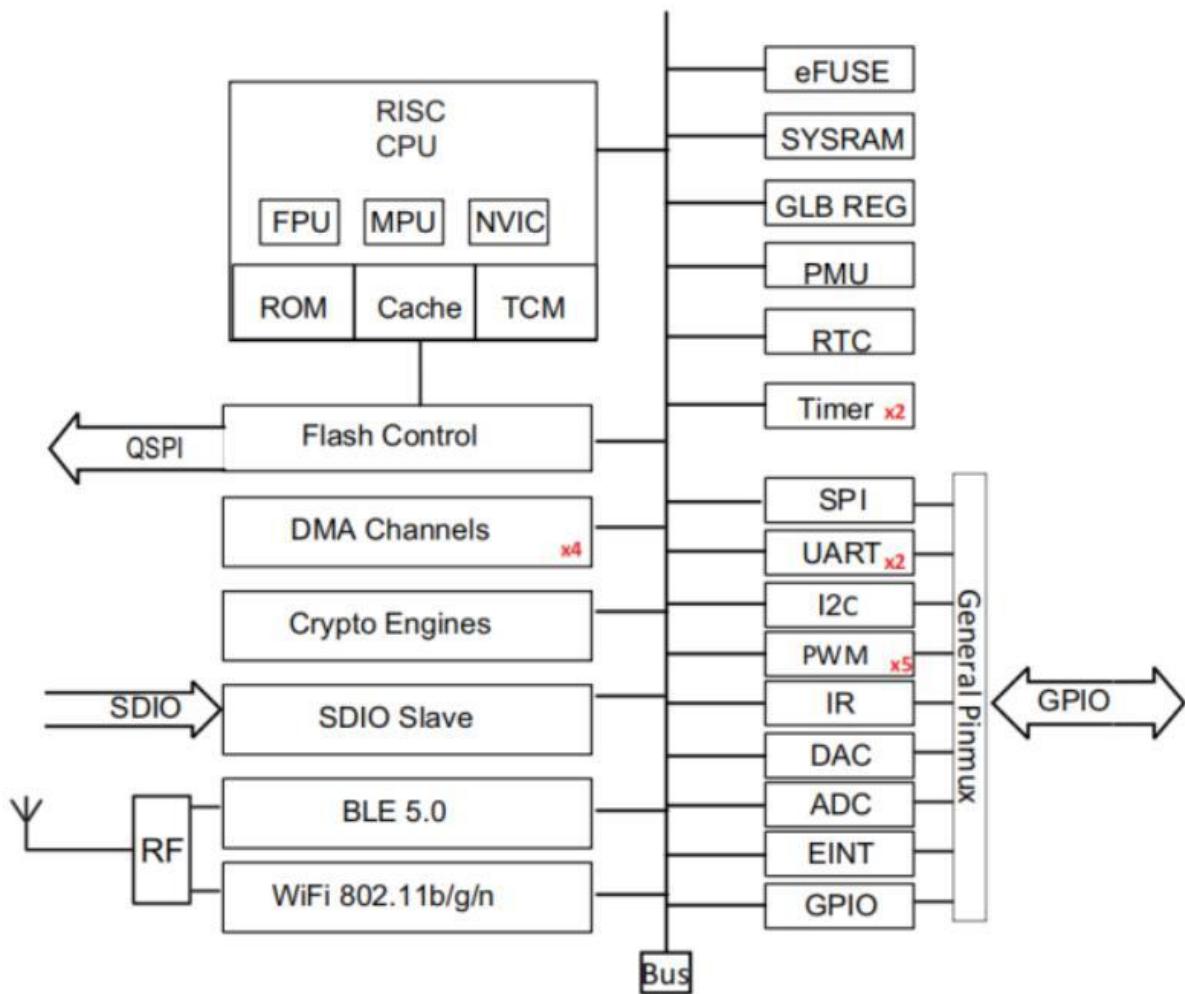
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- Intelligent home appliances: air conditioning, air fryer, rice cooker, water purifier, tea bar machine, health pot, tea bar machine, multi-function machine, wall breaking machine, cooking machine, electric fan, purifier, electric cooking pot and other large and small home appliances
- Smart home: switch panel, smart socket, smart plug-in, electric curtain, temperature controller, sensor, infrared socket, infrared remote control, smart door lock, smart lamp, smart lamp, smart desk lamp, smart drive power supply, smart desks and chairs and other smart home products
- Health care: blood pressure monitor, body fat weight, oximetry, etc

## 2. Module specifications

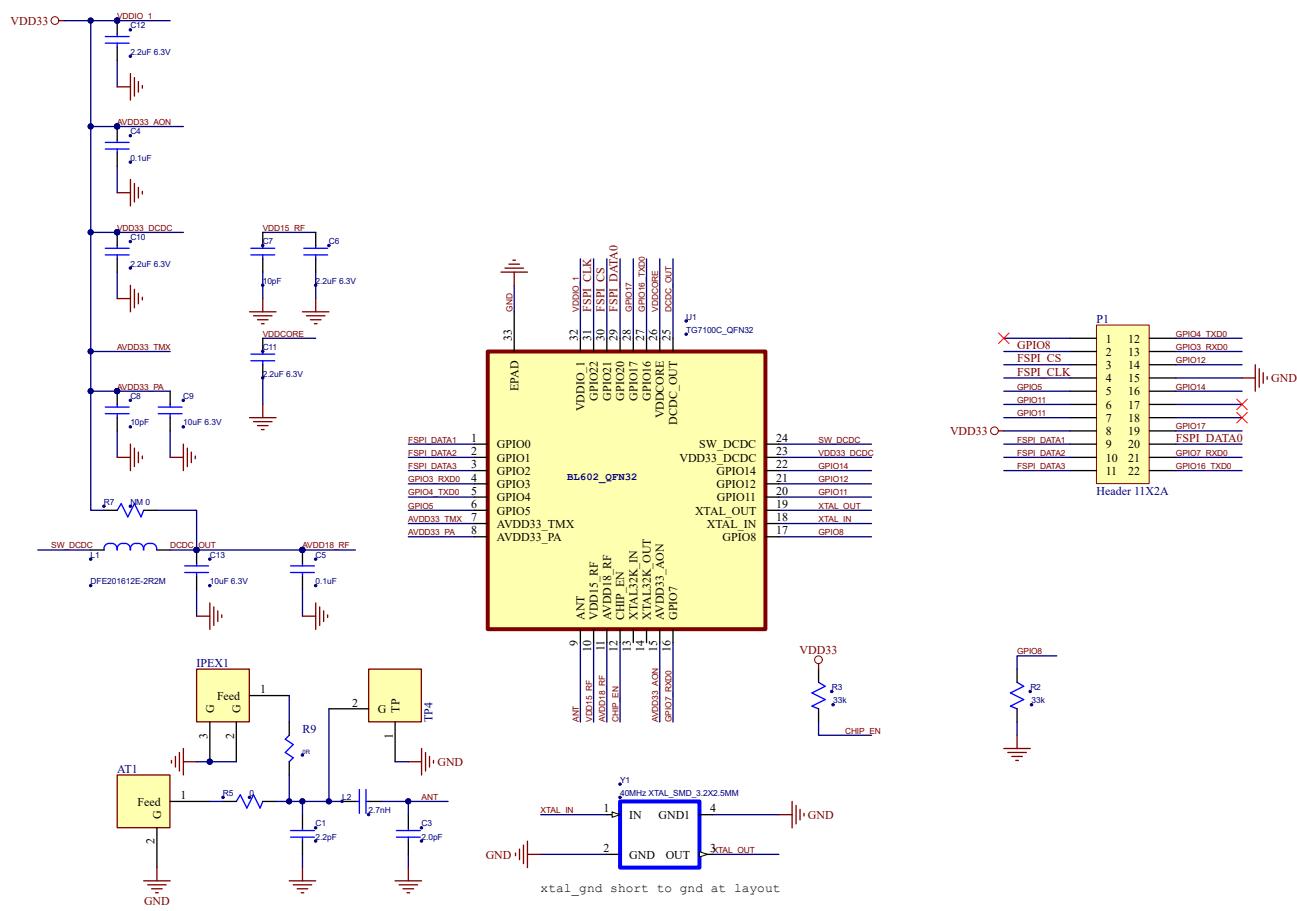
### 2. 1 Hardware architecture

#### 2. 1. 1 Hardware block diagram

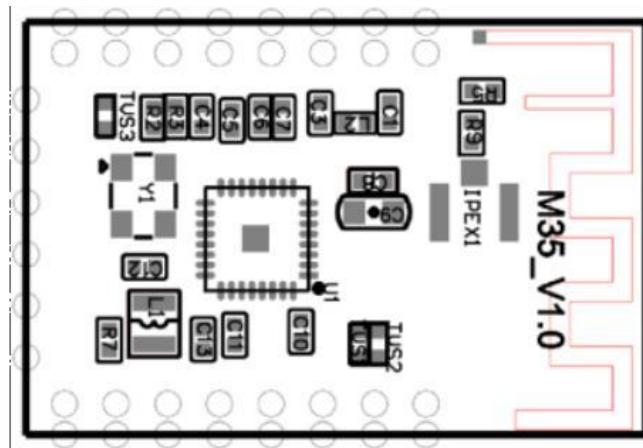


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## 2. 1. 2 Hardware schematic diagram

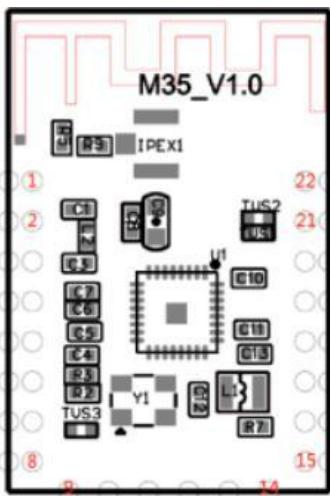


## 2. 1. 3 Number figure



## 2. 2 The pin definition

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The interface pin is defined in the following table:

	The pin definition	function
1	CHIP_EN	Chip enables / reset the pin, need not be suspended
2	GPIO_8	Universal I / O, need not be suspended, burning program needs to pull up
3	FSPI_CS/GPIO_21	Universal I / O, no need to be suspended
4	FSPI_CLK/GPIO_22	Universal I / O, no need to be suspended
5	GPIO_5	Universal I / O, no need to be suspended
6	GPIO_11	Universal I / O, no need to be suspended
7	NC	Air traffic control foot, need not be suspended
8	VD33	Power supply is 3.3V
9	FSPI_DATA1/GPIO_0	Universal I / O, no need to be suspended
10	FSPI_DATA2/GPIO_1	Universal I / O, no need to be suspended
11	FSPI_DATA3/GPIO_2	Universal I / O, no need to be suspended
12	UART_TXD/GPIO_4	Service communication port, serial port transmission, and serial port reception of the main control board
13	UART_RXD/GPIO_3	Service communication port, serial port reception, serial port transmission connected to the main control board
14	GPIO_12	General I / O, not suspended, some products are used for status indicators
15	GND	landing

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16	GPIO_14	Universal I / O, no need to be suspended
17	NC	Air traffic control foot, need not be suspended
18	NC	Air traffic control foot, need not be suspended
19	GPIO_17	Universal I / O, no need to be suspended
20	FSPI_DATA0/GPIO_20	Universal I / O, no need to be suspended
21	RXD0/GPIO_7	Debugging mouth, can not be suspended, serial port to receive the pin RXD
22	TXD0/GPIO_16	Debugging port, can not be suspended, serial port to send the pin TXD

## 2. 3 RF parameters

### 2. 3. 1 Basic RF characteristics

Parameter item	define
frequency range	2.400~2.4835GHz
Wi-Fi standard	IEEE 802.11b/g/n (Channel 1-14)
Bluetooth standard	Bluetooth 5.0
rate of data signalling	11b:1,2,5.5,11 (Mbps)
rate of data signalling	11g:6,9,12,18,24,36,48,54(Mbps)
rate of data signalling	11n:HT20 MCS0~7
Antenna type	PCB onboard antenna, antenna gain 1.5-2.5dBi

### 2. 3. 2 Launch performance

TX Continuous sending performance:

Parameter item	least value	representative value	crest value	unit

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RF average output power, 802.11b CCK Mode 11M	-	11.5	-	dBm
RF average output power, 802.11g OFDM Mode 54M	-	7	-	dBm
RF average output power, 802.11n OFDM Mode MCS7	-	6.5	-	dBm
RF average output power, Bluetooth 5.0 1M	-	6	-	dBm
frequency error	-10	-	10	ppm
EVM@802.11b CCK 11Mbps Mode 20dBm	-	-	-10	dB
EVM@802.11g OFDM 54Mbps Mode 18dBm	-	-	-28	dB
EVM@802.11n OFDM MCS7 Mode 17dBm	-	-	-28	dB

### 2. 3. 3 receptivity:

Parameter item	least value	representative value	crest value	unit
PER <8%, RX sensitivity, and 802.11b CCK Mode 11M	-	-98	-	dBm
PER <10%, RX sensitivity, and 802.11g OFDM Mode 54M	-	-77	-	dBm
PER <10%, RX sensitivity, and 802.11n OFDM Mode MCS7	-	-73	-	dBm
PER <10%, RX sensitivity, Bluetooth 5.0	-	-93	-	dBm

## 2. 4 Electrical parameters

### 2. 4. 1 Absolute electrical parameters

parameter	description	least value	crest value	unit
Ts	Storage temperature	-55	85	°C
VDD	service voltage	3.0	3.6	V
Electrostatic release voltage (contact)	TAMB-25°C	-	4	KV

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Electrostatic release voltage (air)	TAMB- 25°C	-	8	KV
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## 2. 4. 2 going

parameter	description	least value	representative value	crest value	unit
Ta	working temperature	-40	-	85	°C
VDD	service voltage	3.0	3.3	3.6	V
IDD	supply current				mA
VIO	IO voltage		3.3		V
VIL	The IO low-level input				V
VIH	IO high-level input	0.75V DD	-	VDD+0.3	V
VOL	The IO low-level output	-	-	0.1VDD	V
VOH	The IO high-level output	0.8V DD	-	-	V

## 2. 4. 3 Module power consumption

parameter	minimum current (mA)	Typical current (mA)	maximum current (mA)	Typical power consumption (mW)
AP	30	31	32	155
In the distribution network state	47	48	50	240
Connect the router	47	49	51	245
Connection platform	47	49	51	245
Distribution network success	46	48	49	240

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average value	44	45	47	225
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## 2. 4. 4 RF power consumption

Power consumption during TX continuous transmission:

symbol	pattern	power	average value (mA)	Peak value (typical value mA)
IRF	11b 1Mbps	18dB m	185	295
IRF	11b 11Mbps	18dB m	190	310
IRF	11g 54Mbps	16dB m	145	230
IRF	11n BW20 MCS7	13dB m	125	210

RX:

symbol	pattern	average value (mA)	Peak value (typical value mA)
IRF	11B 11M	35	37
IRF	11G 54M	39	40
IRF	11N HT20 MCS7	39	40

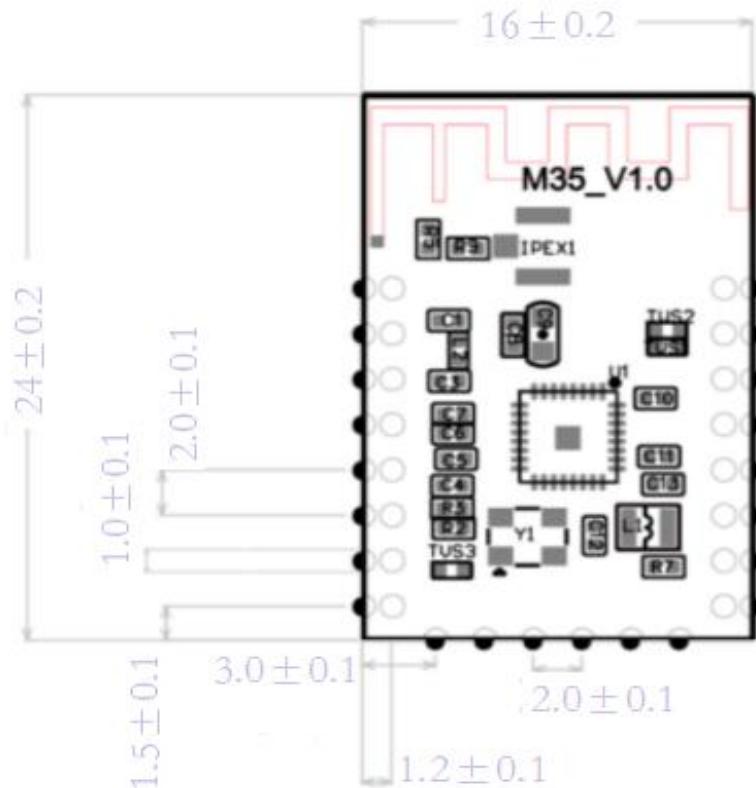
## 2. 5 Size encapsulation information

M35T has 3 rows of pins with a pin spacing of 2mm.

M35T size:  $24 \pm 0.2$  mm (W)  $16 \pm 0.2$  mm (L)  $2.6 \pm 0.2$  mm (H). M35T, with dimension maps shown as in

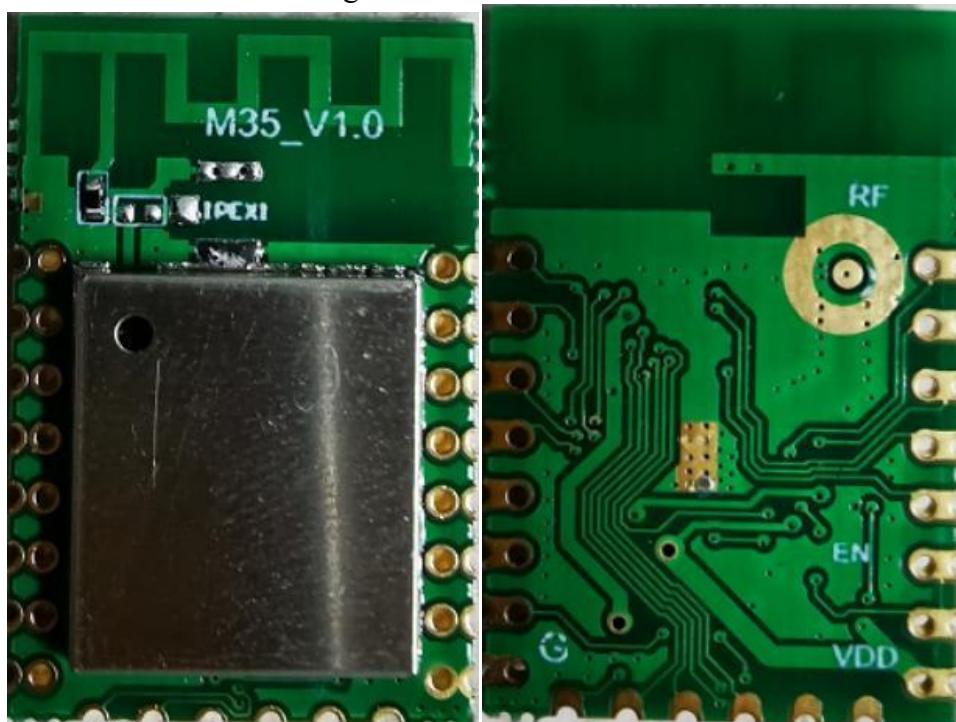
As shown in the figure:

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### 2.5.1 Module size

Module three-sided diagram

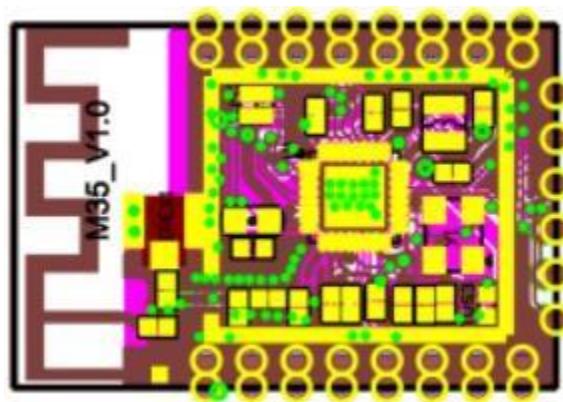


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## 2. 5. 2 Module packaging

PCB Layout



Module tag

Modullabel style:



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Description of label paper content: label paper size: 13mm \* 11mm

M35T-xxxx: refers to the material code customized by the company for customers to distinguish the internally defined customer or product code Miotlink: The manufacturer is Miaolian

Made in: Production site

CMIIT ID: refers to the module SRRC

certification number MAC: Module

MAC address (unique to each module)

## 2. 6 Antenna information

### 2.6.1 Antenna type

PCB onboard antenna and IPEX external antenna coexist and are converted by jumping resistance.

### 2.6.2 Antenna parameters

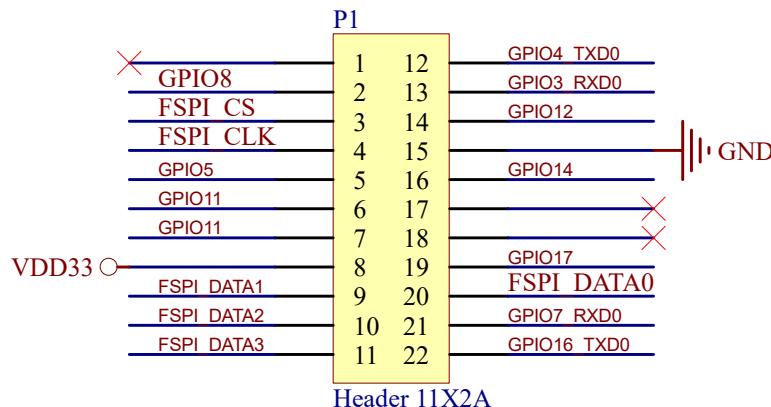
Electrical parameters	
Frequency (Frequency)	2400~2500MHz
Voltage standing wave ratio (V.S.W. R)	$\leq 2.0$ @ 2400~2500MHz
Return Loss (Return Loss)	$\leq -10\text{dB}$ @ 2400~2500MHz
Antenna gain (Antenna Gain)	1.5~2.5 dBi
Radiation efficiency (Radiation Efficiency)	60%
Polarization mode (Polarization)	Linear nature (Linear)
Impedance (Impedance)	50 Ohm

## 3. Hardware design guidance

### 3. 1 Schematic design

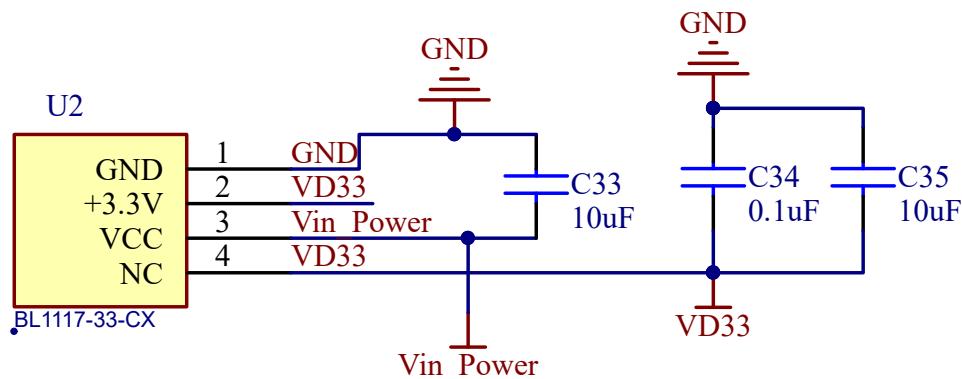
#### 3. 1. 1 Module interface circuit diagram

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### 3. 1. 2 Power supply design

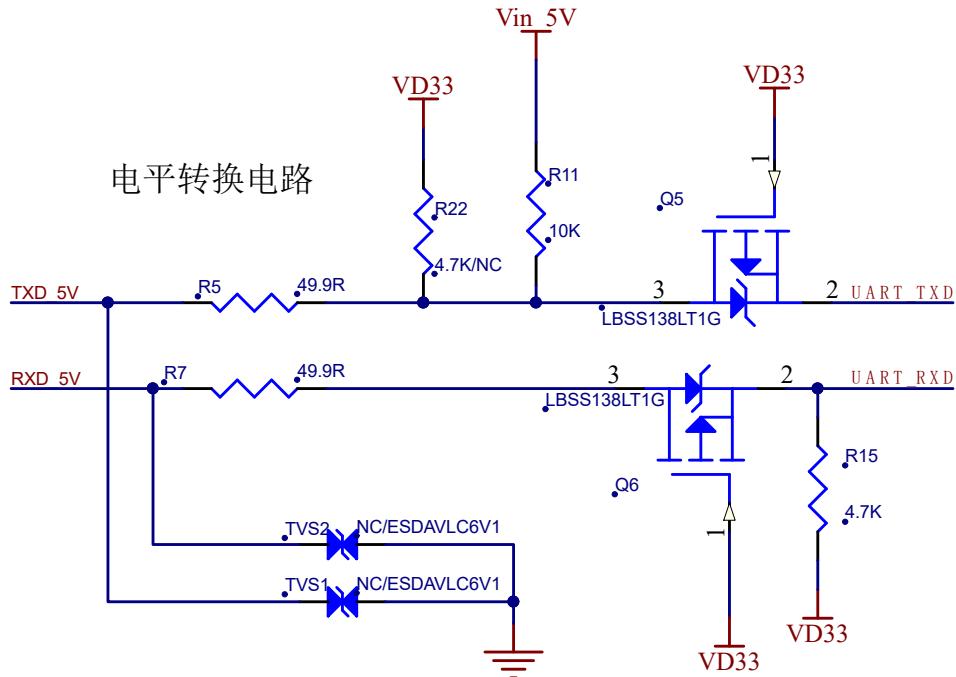
The external power supply voltage is generally 5V to 3.3V, the power supply current is 300 mA, the ripple below 50mV. The reference circuit is as follows:



### 3. 1. 3 String design

The external serial port level conversion reference circuit is shown below:

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### 3. 1. 4 Debug Serial port design

Reference module interface circuit diagram, pin21, pin22 feet correspond to Debug \_ RXD, Debug \_ TXD respectively.

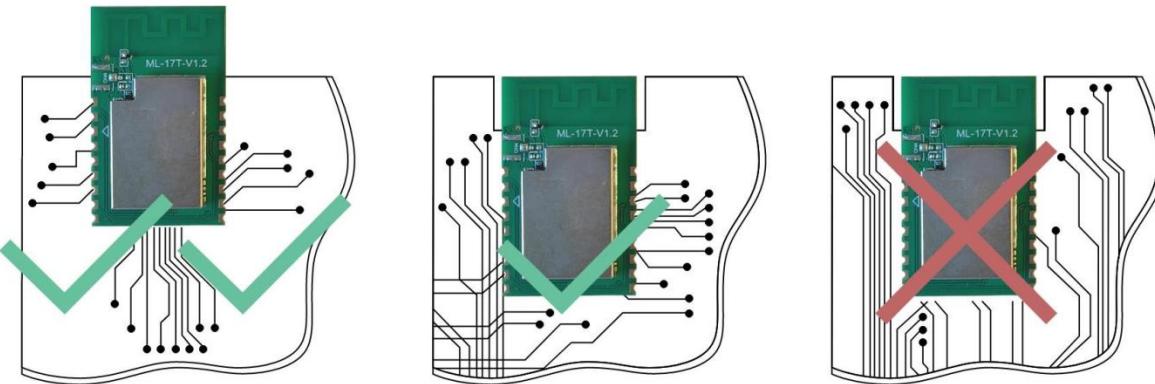
## 3. 2 PCB antenna design requirements

### 3. 2. 1 PCB onboard antenna

A) Module recommended at the edge of the bottom plate, and the antenna outward, antenna at least 25mm around the internal clearance, away from metal devices, sensors, transmission of high frequency signal devices and high frequency signal line: increase the distance makes the interference source energy with the increase of distance, and then reduce the noise coupling, improve the overall performance of the antenna.

B) Do not routing under the PCB antenna and do it. It is recommended that the slotted width below the antenna is at least 3mm from the edge of the antenna plate.as illustrated in following figure:

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- C) Avoid taking high-speed signals around and below the module. If it cannot be avoided, it is recommended to strictly follow the high-frequency signal processing rules, and try to process the high-speed signals in groups when data or addr lines are involved.
- D) All module power interfaces and power supply that require power supply, please use the same power network to ensure the same power sequence of the module power interface.

### 3. 2. 2 External antenna module

- a) Avoid placing the external pull antenna inside the device with a metal enclosure.
- b) Avoid pulling metal objects close to the antenna, (at least 2.5cm, above, more than 3cm).
- c) Do not place the external antenna (including the antenna cable) next to the devices with electric radiation, such as transformer, DCDC, power inductance, etc.

## 4. Production guide

- It is recommended to weld with wave peak welding equipment. Manual welding is used without welding using the crest welding equipment. After unpacking the package, the module must be welded within 24 hours, otherwise it should be placed in the drying cabinet with humidity not exceeding 10% RH, or vacuum packed and record the exposure time. The total exposure time shall not exceed 168 hours.
- Equipment and materials required for welding:
  - Peak welding equipment
  - Wave peak welding treatment tool
  - Temperature soldering iron
  - Sn strip, tin wire, welding flux
  - Furnace temperature tester
- Instrument or equipment required for baking:
  - Cabinet baking box

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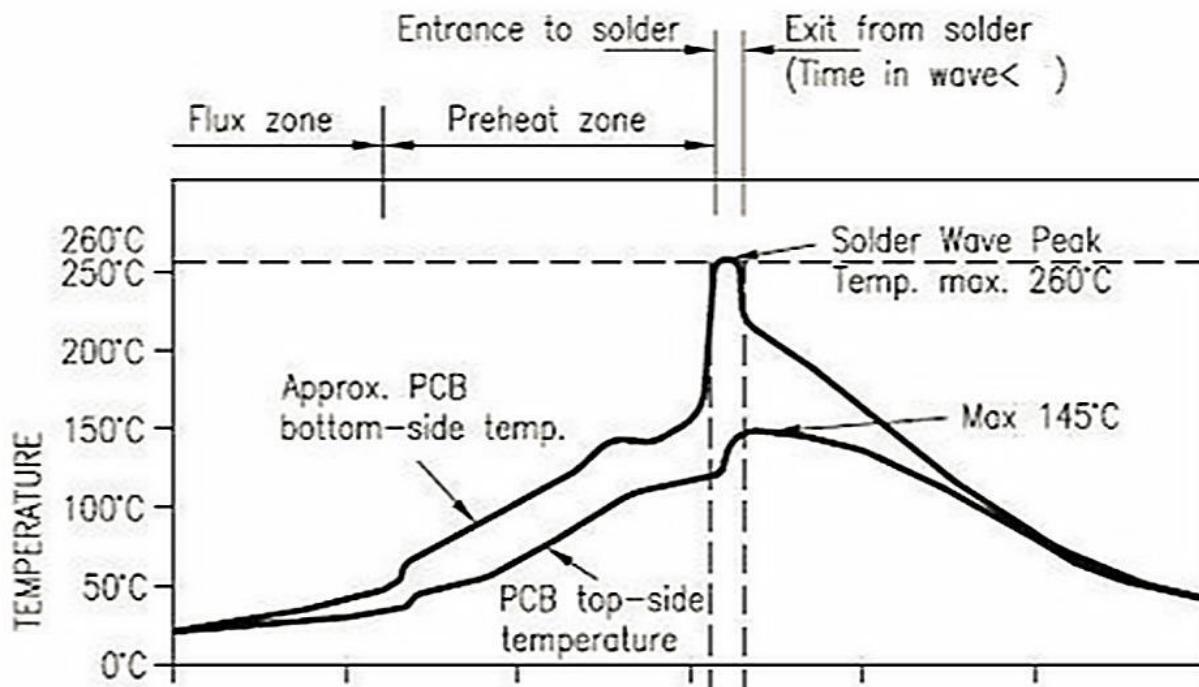
- Antistatic and high-temperature resistant tray
  - Antistatic and high-temperature resistant gloves
- The factory module shall be baked in the following possible conditions:
  - The vacuum packaging bag was damaged before unpacking
  - After unpacking, no humidity indicator card was found in the packaging bag
  - After unpacking, if the humidity indicator card reads 10% or above, the color ring turns pink
  - Total exposure time exceeded 168 hours after unpacking
  - More than 12 months from the date of the first sealed packaging
- The baking parameters are as follows:
  - Baking temperature: 60°C 5% RH, 125°C 5% RH (non-resistant tray)
  - Baking time: 48 hours for reel packaging and 12 hours for tray packaging
  - Alarm temperature setting: 65°C, 135°C
  - Production can be performed after cooling of <36°C under natural conditions
  - **Bakingtimes: 1 time**
  - If it is not used up within 168 hours after baking and unpacking, please bake again
  - If the unpacking time is more than 168 hours without baking, it is forbidden to weld this batch of modules by wave peak welding process. Because the module is level 3 wet sensitive device exceeds the allowed exposure time is likely to be damp, and poor welding may lead to device failure during high temperature welding.
- Provide electrostatic discharge (ESD) protection of the module throughout production.
- In order to ensure the good quality of the product, the focus on the amount of flux spraying during production. Peak height, whether the content of tin slag and copper in the peak solder cylinder exceeds the standard, whether the thickness of the window and treatment tool is appropriate, and the rationality of the temperature curve of the peak welding furnace.

## 4. 1 Furnace temperature curve and temperature recommendations are recommended

Please refer to the peak welding furnace temperature recommendations, and the furnace temperature setting is  $260^{\circ}\text{C} \pm 5^{\circ}\text{C}$ . Peak welding temperature curve is shown in the following figure:

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## DIP Type Product Pass Wavesolder Graph



Welding temperature recommendation:

Recommended temperature curve of wave peak welding furnace		Manual welding temperature recommendations	
preheat temperature	80-130°C	welding temperature	360°C±20°C
preheating time	75-100S	weld period	Less than 3S / point
Wave peak contact time	3-5S	NA	NA
Tin cylinder temperature	260±5°C	NA	NA
Heating slope	≤2°C/S	NA	NA
Cooling slope	≤6°C/S	NA	NA

## 4. 2 storage condition

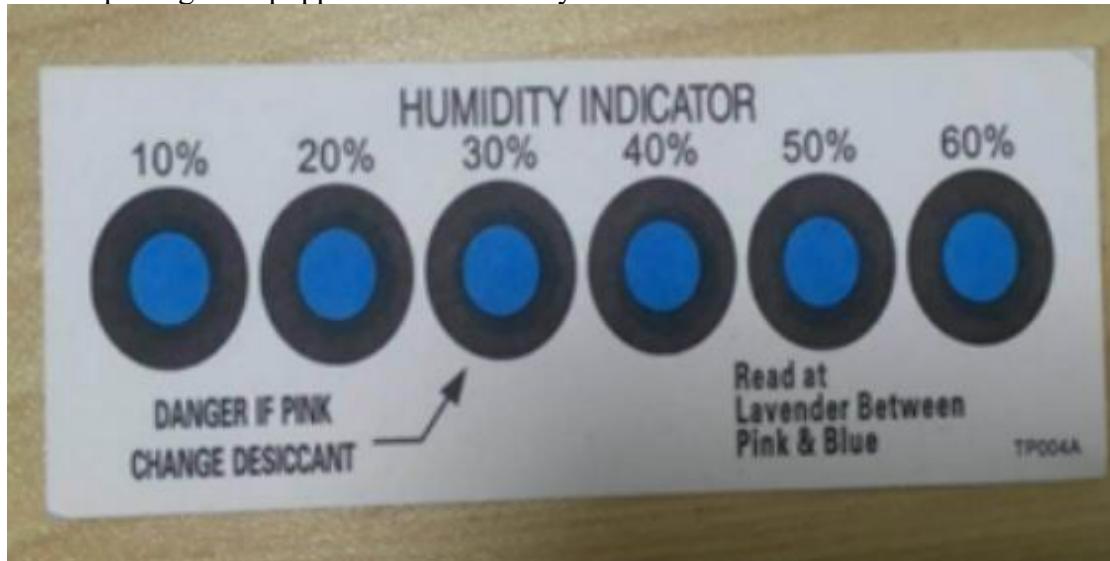
The factory module storage conditions are as follows:

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Use a proof bag and stored in temperature <40°C and humidity <90% RH.

The shelf life of dry packaged products is 12 months from the date of package sealing.

Seal package is equipped with a humidity indicator card:



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**警示**  
本隔潮袋装有  
**潮湿敏感器件**

等级 (MSL)  
3  
如果缺省，见相邻的条码标签

1. 经计算密封袋内器件的保存期限：在<40 °C及<90%相对湿度 (RH)条件下为12 个月

隔潮袋密封日期: \_\_\_\_\_ 详见生产日期  
如果缺省，见相邻的条码标签

2. 封装本体峰值温度: 260 °C  
如果缺省，见相邻的条码标签

3. 打开袋后，将要采用再流焊接或者其它高温工艺加工的器件必须

- 在车间环境≤30 °C/60% RH条件下，在 168 小时  
如果缺省，见相邻的条码标签  
内贴装，或
- 按照J-STD-033贮存

4. 贴装前，器件要求烘烤，如果：

- 在23±5 °C下读取时，对于等级为2a-5a级的器件，湿度指示卡读数>10%；或者对于等级为2级的器件，湿度指示卡读数>60%
- 上述的3a或者3b条件不满足

5. 如果要求烘烤，参见IPC/JEDEC J-STD-033中的烘烤程序。

注 1: IPC/JEDEC J-STD-020规定了等级和封装本体温度

#### 4. 3 Model MOQ, along with the package information

product model	MOQ(pcs)	Shipping packaging method	The number of modules per reel	Number of rerolls per box
M35T series	3000	Load coil	1000	1

## **FCC Statement:**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## **FCC Caution**

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

## **Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

## **List of applicable FCC rules**

This module has been tested and found to comply with Part15C, Section 15.247 requirements for Modular Approval.

## **End Product Labeling**

This transmitter module is authorized only for use in device where the antenna may be installed such that 20cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains FCC ID:

2BQ9V-M35T". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

The end product shall bear the following 15.19 statement: This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

### **This device is intended only for integrators under the following conditions: (For module device use)**

1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and

2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

### **Part 15 Subpart B disclaimer**

This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B rule requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.

As long as all conditions above are met, further transmitter test will not be required. However, the integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

### **Manual Information To the End User**

The integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module. The end user manual shall include all required regulatory information/warning as shown in this manual.

The host integrator must follow the integration instructions provided in this document and ensure that the composite-system end product complies with the requirements by a technical assessment or evaluation to the rules and to KDB Publication 996369.

The host integrator installing this module into their product must ensure that the final composite product complies with the requirements by a technical assessment or evaluation to the rules, including the transmitter operation and should refer to guidance in KDB 996369.

## **Host manufacturer responsibilities**

Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment.

### **IMPORTANT NOTE:**

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the integrator will be responsible for reevaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

The module is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitter(s) or being used in a portable condition will need a separate reassessment through a class II permissive change application or new certification.